Language attrition: A matter of brain plasticity?

Some preliminary thoughts

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Appendix

Table 1. Summary of a selection of studies about structural changes in foreign language learning and bilingualism

Authors	Participants	Languages	Time spans	Features investigated	Task	Results
Mårtensson et al. (2012)	14 military interpreters 17 controls	L1 Swedish FL Arabic, Dari or Russian	3 months course	Cortical thickness Hippocampal volume	Language classes	Cortical thickness increase in left dorsal MFG, left IFG and left STG. Increase in volume of right hippocampus. Language learning correlated to changes in right hippocampus and left STG.
Schlegel, Rudelson & Tse (2012)	11 college students, 16 control subjets Age 20.05 years ($SD = 1.89$)	L1 English FL Chinese	9 months course (7.5 hours/ week) (monthly scanning)	WM tracts	Language classes	Systematic, learning-dependent changes in white matter tracts between language processing regions and a bilateral frontal

Table 1. *(continued)*

Authors	Participants	Languages	Time spans	Features investigated	Task	Results
						network. Correlations with language learning success.
Hosada et al. (2013)	24 students or graduates, mean age = 20.1 20 age-matched controls	L1 Japanese L2 English (basic)	16 weeks vocabulary training	GM volume Connectivity	Vocabulary training	Individuals with more extensive L2 vocabulary had larger GM volume in IFGop, caudate nuclei, STG/SMG, ACC (all bilaterally). Correlations with vocabulary were stronger in RH, for both GM volume and WM tracts.
Xiang et al. (2015)	37 students (age 18–20)	L1 German FL Dutch	6- week course (20 hours/week)	Diffusion tensor imaging	Language classes	Laterality shift in structural connectivity between frontal and temporal lobe from LH to RH, and then back again after the end of the training. Stronger RH laterality in less proficient learners.
Hofstetter et al. (2017)	Students	L1 L2	1h	Diffusion tensor imaging	Novel word learning (flower names)	Changes in diffusivity in IFG, MTG and inferior parietal lobule, correlated to

Table 1. *(continued)*

Authors	Participants	Languages	Time spans	Features investigated	Task	Results
						lexical learning rate.
DeLuca, Rothman & Pliatsikas (2019)	9 bilinguals (8 females, age = 35.33 years, *SD* 8.12 LOR = 134 months, *SD* 111.7 AoA L2 = 10.5 years, *SD* 4.6	L1 various L2 English	3.22 years; *SD* = 0.12	GM volume WM volume Resting state connectivity	Continuous residence in the UK and practice of L2	No changes for WM and functional connectivity. Increase of GM volume in lower left cerebellum and reshaping of bilateral hippocampus, left amygdala and left caudate.

Note: GM = grey matter, WM = white matter, RH = right hemisphere, LH = left hemisphere, MFG = middle frontal gyrus, IFG = inferior frontal gyrus, STG: superior temporal gyrus, op = opercularis, SMG = supramarginal gyrus, ACC = anterior cingulate cortex, MTG = middle temporal gyrus.

Table 2. Summary of studies on re-exposure following L1 attrition in adult bilinguals

Authors	Participants	Languages	Time spans	Features investigated	Task	Results
Sancier & Fowler (1997)	1 bilingual participant	L1 Brazilian L2 English	Several changes after several months in each country age 23–27	Perception test and acoustic and electro-glottographic analysis of VOT	Bidirectional translation task followed by perception test and acoustic analysis	Gestural drift for VOT was observed both in the perception test and in the acoustic analysis following each stay both in the direction of L1 after stays in Brazil and L2 after time spent in the US.
Stolberg & Münch (2010)	1 bilingual participant	L1 German L2 English	LoR = 47 years 4 years of interviews every 2–3 months	Deviations at the lexico-semantic, syntactic and morphological level	Natural conversation with the researchers	High variability in deviation suggesting emerging optionality. Number of deviations decreases over the recordings.
Chamorro, Sorace & Sturt (2016)	(1) 24 re-exposed bilinguals (2) 24 control immigrants (3) 24 recent arrivals	L1 Spanish L2 English	1 + 2: mean LoR = 7 ys 1: Re-exposure of at least 1 week 3: mean LoR 8 weeks	Overt/null subject pronouns	Offline judgment task Online eye tracking	No differences in offline task. Non-exposed attriters (group 2) differ from groups 1 and 3 in the sensibility to

Table 2. *(continued)*

Authors	Participants	Languages	Time spans	Features investigated	Task	Results
						pronoun mismatch in online task.
Köpke & Genevska-Hanke (2018)	1 bilingual participant 10 predominantly monolingual Bulgarian native speakers	L1 Bulgarian L2 German	Point 1 (LoR = 12 ys) (a) in Germany (b) after 2.5 weeks in Bulgaria Point 2 (LoR = 17 ys) (a) in Germany (b) after 3 weeks in Bulgaria	Overt/null subject pronouns	Natural conversation with the researcher	Point 1: In Germany, the bilingual produced significantly more overt pronouns in L1 than the controls. After 2.5 weeks in Bulgaria, her performance was again in the range of the controls. Point 2: The bilingual was again in the range of the controls, both in Germany and in Bulgaria.
Gargiulo & van de Weijer (2020)	20 bilinguals 21 monolingual controls	L1 Italian L2 Swedish	Mean LoR = 11.8 ys Summer vacation	Overt/null subject pronouns	Selection of pronoun antecedent in self-paced comprehension task	Response selection: attrition effect on null pronouns, but no difference between sessions. RT: both groups improve

Table 2. *(continued)*

Authors	Participants	Languages	Time spans	Features investigated	Task	Results
						over the sessions. Task effect rather than re-exposure effect.

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